

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
24 June 2004 (24.06.2004)

PCT

(10) International Publication Number  
**WO 2004/053086 A3**

(51) International Patent Classification<sup>7</sup>: **C07H 21/04**, 21/02, 21/00, C12P 19/34, 21/06, C12N 1/00, 15/00, 15/09, 15/64, 15/66, 15/70, 15/74, 15/63

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(21) International Application Number:  
PCT/US2003/038966

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(22) International Filing Date: 8 December 2003 (08.12.2003)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/431,494 6 December 2002 (06.12.2002) US

(84) Designated States (*regional*): ARIPO patent (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

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Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

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(88) Date of publication of the international search report:  
6 May 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2004/053086 A3

(54) Title: **PLASMODIUM FALCIPARUM ANTIGENS AND METHODS OF USE**

(57) Abstract: The subject invention provides novel *Plasmodium falciparum* antigens and novel polynucleotides encoding these antigens. Also provided by the subject invention are methods of using these antigens and polynucleotides.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US03/38966

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : C07H 21/04, 21/02, 21/00; C12P 19/34, 21/06; C12N 1/00, 15/00, 15/09, 15/64, 15/66, 15/70, 15/74, 15/63  
 US CL : 536/23.1, 25.3; 435/320.1, 252.3, 69.1, 69.3, 91.1, 91.4+

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 536/23.1, 25.3; 435/320.1, 252.3, 69.1, 69.3, 91.1, 91.4+

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GARDNER M.J. Genmoe sequence of the human malaria parasite Plasmodium falciparum. Nature. 2002, Vol 419, pages 498-511, see entire document.	1, 7-10
X	CARLTON J. The Plasmodium vivax and P. berghei gene sequence tag projects. Parasitology Today. 2000, Vol 16. No. 10, page 409, see entire document.	1, 7-10
X	DAME J.B. Current status of the Plasmodium falciparum genome project. Molecular and Biochemical Parasitology. 1996, Vol 79, pages 1-12, see entire document.	1, 3, 4, 7-13
X	GARDNER. M.J. Chromosome 2 sequence of the Human Malaria Parasite Plasmodium falciparum. Science. November 1998, Vol 282, pages 1126-1132, see entire document.	1, 3, 4, 7-13
X	Bowman. S. The complete nucleotide sequence of chromosome 3 of Plasmodium falciparum. Nature. August 1999, Vol 400, pages 532-538, see entire document.	1, 3, 4, 7-13
X	US 5,766,597 A (PAOLETTI et al) 16 June 1998 (16.06.98), see entire document, SEQ ID NO: 11.	1, 3, 4, 7-13
X	WO 87/03882 A1 (THE WALTER AND ELIZA HALL INSTITUTE OF MEDICAL RESEARCH) 2 JULY 1987 (02.07.87), see entire document.	1, 3, 4, 7-13

Further documents are listed in the continuation of Box C.

See patent family annex.

* Special categories of cited documents:	"T"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X"	document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent published on or after the international filing date	"Y"	document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&"	document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means		
"P" document published prior to the international filing date but later than the priority date claimed		

Date of the actual completion of the international search

24 January 2005 (24.01.2005)

Date of mailing of the international search report

17 MAR 2005

Name and mailing address of the ISA/US

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**INTERNATIONAL SEARCH REPORT**

International application No.

PCT/US03/38966

**Box I Observations where certain claims were found unsearchable (Continuation of Item 1 of first sheet)**

This international report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claim Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claim Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
  
3.  Claim Nos.: 5,6 and 19-21 (omproper multiple dependent claims)  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box II Observations where unity of invention is lacking (Continuation of Item 2 of first sheet)**

This International Searching Authority found multiple inventions in this international application, as follows:  
Please See Continuation Sheet

1.  As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3.  As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.: 1,3,4 and 7-13

**Remark on Protest**  

The additional search fees were accompanied by the applicant's protest.

No protest accompanied the payment of additional search fees.

**INTERNATIONAL SEARCH REPORT**

PCT/US03/38966

**BOX II. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING**

This application contains the following inventions or groups of inventions, which are not so linked as to form a single general inventive concept under PCT Rule 13.1. In order for all inventions to be examined, the appropriate additional examination fees must be paid.

Group I, claims 1, 3, 4 and 7-13, drawn to a polynucleotide.

Group II, claims 2-4, 7, 8 and 14-18, drawn to primer or probe.

Group III, claims 22-24, drawn to a polypeptide.

Group IV, claim 25, drawn to a method of inducing an immune response.

Group V, claims 26 and 27, drawn to a composition.

Group VI, claim 28, drawn to a method of detection.

Group VII, claim 29, drawn to an antibody.

This application contains claims directed to more than one species of the generic invention. These species are deemed to lack unity of invention because they are not so linked as to form a single general inventive concept under PCT Rule 13.1.

In order for more than one species to be examined, the appropriate additional examination fees must be paid. The species are as follows:

Each of the 7 different inventions also claim the specific sequences as set forth in SEQ ID NO: 1-27 and those set forth in Tables 2, 3, 4, 5 and 6. Applicants should elect no more than 10 (ten) sequences for examination in this PCT application.

The inventions listed as Groups I-VII do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: the prior art Gardner et al (Nature, Oct. 3, 2002, 419/6906:498-511) or Carlton et al (Parasitology Today, 2000, 16/10:409) discloses the same or corresponding special technical feature of an isolated and purified polynucleotide sequence encoding a polypeptide sequence; the claimed SEQ ID NO: 2 is disclosed in both Gardner et al and Carlton et al.

**Continuation of B. FIELDS SEARCHED Item 3:**

WEST, MEDLINE, STN, WIPO, CA, BIOSIS, EMBASE, GENBANK, GenEmbl, EST, inventor names, polynucleotide, plasmodium falciparum, vectors, malaria, SEQ ID NO: 2, 4, 5, 7, 8, 12, 13, 15, 16, 25, 26; fragments, variants, vaccine